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ABSTRACT

These materials consist of a test manual and two forms of the test with corresponding answer keys. The test provides a measure of the conventional sequence of arithmetic computation and selected applications. Each form consists of 44 completion items, with space for figuring. It is claimed that this type of response greatly reduces the guessing effect. (MM)

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DIAGNOSTIC MATHEMATICS

TEST MANUAL

PRODUCED AND DISSEMINATED BY THE
NATIONAL CONSORTIA FOR BILINGUAL EDUCATION
FORT WORTH, TEXAS

SE 015 001

DIAGNOSTIC MATHEMATICS

TEST MANUAL

DEVELOPED BY

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TABLE OF CONTENTS

I Description and Purpose 1

II General Directions for Administration 2

III General Instructions for Scoring 4

IV Supplementary Rules for Scoring 6

Appendix

I Cluster Analysis

II Score Sheets

Form A

Form B

Description and Purpose

The Diagnostic Mathematics Test consists of 44 items. It identifies student mastery in mathematics at the ninth and tenth grades and may be used in some cases at the upper elementary and junior high school level. Particular skills are isolated for diagnosis and feedback to the instructional staff. (See Appendix, Cluster Analysis.)

The test provides a measure of the conventional sequence of arithmetic computation and selected application problems in a form which requires students to show their work. Conventional standardized tests, where students select an option for an item and record the selection on a separate answer sheet, provides less valid indications of their understanding and skill than might be observed in their daily performance. The Diagnostic Mathematics Test requires students to show their work and greatly reduces the chance factor of student guessing.

The time required to complete the test is 30-45 minutes. The student establishes his own pace; however, 50 minutes is the maximum time allowed.

The test is in "Form A" and "Form B". The two forms may be used as pre-and post-assessments to observe growth in student populations.*

* Dr. Harsh has computed the statistical significance of the changes that were observed in comparison of student populations. The Kuder Richardson reliabilities which were computed by Dr. Harsh for the two forms range from .837 to .938.

GENERAL DIRECTIONS FOR ADMINISTRATION

Administration

- This test may be given individually or to a group.
- The identification information on the front cover of the student test booklet should be completed prior to testing.
- Student responds by working the problems in the test booklet, using the space provided for each of the items.
- The student will establish his own pace in completing the test (approximately 30-45 minutes); however, period of testing should not extend beyond 50 minutes.
- Examiner should make certain that ample time is available for administration of the entire test. To insure maximum performance of students, it is recommended that the testing session be scheduled in the morning.

Student Test Booklet

These booklets are for individual or group administration. Students respond by showing their arithmetic computations of the mathematical problems in the space provided for each item.

There are two forms of the test, Form A (green cover) and Form B (orange cover). Examiner should see that the student(s) gets the intended form.

Preparation of Materials

Student test booklet for each person.

Pencil with eraser for each student.

"Testing - Do not Disturb" sign for the door(s).

The examiner is responsible for distributing and collecting all test materials.

Pupil and Room Preparation

The room should be quiet, well lighted, properly ventilated, and free of visual distractions.

Student desks should be arranged in such a manner as to decrease the likelihood of one student seeing another student's booklets.

General Considerations

The examiner should tell the students not to open their booklets until told to do so.

The examiner should encourage the children to work diligently at their own pace; however, the time allowed for the test should be specified.

The examiner should read the directions exactly as they appear and should not elaborate on any of the test items.

GENERAL INSTRUCTIONS FOR SCORING

If your program has been selected by the National Consortia to validate this test, it is requested that all test booklets and score sheets be returned to the Consortia. The Consortia will be responsible for test scoring and analysis in this case. For those teachers who desire immediate feedback, a scoring key is included in this manual. (See Appendix II)

The test consists of 44 items (A-1 through A-44 or B-1 through B-44) graded according to four general categories within which the answer to a problem may fall. This results in each answer receiving one, and only one, of four possible marks (see scoring key in the Appendix II):

[C] The answer may be correct according to the scoring key. If so, the answer is scored as a C. The score may be conveniently recorded by placing an "X" in the C box (e.g., [X]).

[R] The problem is attempted and an answer given which is one of those categorized as R on the scoring key, then the R box should be marked to identify the answer.

[A] The problem was attempted but no answer given or if the problem was attempted and a wrong answer given, then the A box should be marked.

[B] No attempt was made to solve the problem (e.g., the problem was left blank). Then the B box should be marked.

In almost all cases, answers given to problems will be explicitly covered by the allowable answers for each problem given on the scoring key. Where the handling of an answer to a problem is not explicitly covered by the scoring key, a rule for handling this answer will be given among the supplementary rules for scoring. It is important to keep in mind that the

scoring key and supplementary rules for scoring must be assiduously followed. In no case may a scorer depart from the scoring permitted by the scoring key or supplementary rules.

SUPPLEMENTARY RULES FOR SCORING

These rules are designed to cover an R answer not covered by the answers given in the scoring keys. It is anticipated that no such answers will occur, but it is impossible to be sure that all contingencies have been covered in the scoring keys. Thus, in anticipation of the possible non-supplied R answers, general rules covering these exceptions, when they occur, are given below:

1. They are correct except that the student has left them in the form of an improper fraction or non-reduced fraction, or both.

2. They are left as a mixed number containing a non-reduced fraction.

3. They are correct answers to measurement problems except that the answer is not regrouped or is incompletely regrouped into the correct number of larger units in which the answer can be stated.

If it can be established beyond doubt that an answer falls in one of the above three categories and is not included among R answers given on the scoring key, then it should be scored with an R. As a general example of a type of answer which might not be listed on the scoring key, suppose that the answer given by the student is numerically correct except that it is regrouped inappropriately in terms of the size of units asked for in the problem. Suppose the problem calls for the addition of the two measurements and asks for the answer to be in yards, feet and inches (say, 3 yards, 2 feet, and 3 inches); and the student gives an answer which is correct except that it is expressed in feet and fractions of a foot (that is, he expressed the answer as 11.25 feet). His answer is improper in terms of the units in which it is expressed, but it is obviously numerically correct. If this possible improperly expressed answer has not been listed among the R responses on the key, it should still be scored as an R answer.

If parentheses are placed around the units or denomination following the numerical portion of an answer appearing in the scoring keys, it means

that the student's answer need not include the units or denomination for it to be graded according to the key, provided the numerical portion of his answer is the same as the numerical portion of the answer given in the key.

APPENDIX I

CLUSTER ANALYSIS

DIAGNOSTIC MATHEMATICS TEST
Cluster Analysis

	Whole numbers & decimals	Mixed numbers & fractions	Mixed fractions & decimals	Units of measurement	Reducing fractions and mixed numbers to improper fractions	Averages	Area, volume & perimeter	Word Problems	Algebra	Carrying, borrowing, & partial products	Equivalence of fractions, decimals, proportions & percentage	
Addition	B 3 B 5 B 14 B 13	A 25 B 16 B 21 B 39	A 27 B 19	B 9 B 10 B 37				A 33(1) B22U(2)	B 35	A 26		
Subtraction	A 3 A 4 B 1 B 15	A 31 B 4	A 16	A 8 B 36				B 23 B 24(1) B 25(3)		B 8		
Multiplication	A 2 A 6 A 14 B 17	A 17 A 19 B 26 B 30 B 34 B 38		A 9 A 10 A 11 A 12	B 33 B 40		A 20	A 34(2) A 39(2) B 26 F B 27(1) B 28(1)		A 22		
Division	A 1 A 5 A 15 A 24 B 2 B 32	A 28 A 29 B 18	A 18 B 29	B 11	A 13 A 23 B 12	B 6 B 20		A 35(1) A 36(2) A 40(1)	A 30		A 7 A 21 A 32 A 37 A 38 B 7 B 31	

APPENDIX II

SCORE SHEETS

Form A

Form B

DIAGNOSTIC MATHEMATICS TEST
FORM A
SCORE SHEET

NAME:_____ GRADE:_____ DATE:_____

A-1	Ans: 78.702	C R A B
A-2	Ans: 223	C R A B
A-3	Ans: 33507	C R A B
A-4	Ans: 3	C R A B
A-5	Ans: 1 R. 6/6	C R A B
A-6	Ans: 1/5 or .2	C R A B
A-7	Ans: 3/5 R. 6/10 R. 12/20	C R A B
A-8	Ans: .72 or 18/25	C R A B
A-9	Ans: 4.8 or 4-4/5 R. 48/10 R. 4-8/10 R. 24/5	C R A B
A-10	Ans: 17.8 or 17-9/50 R. 17-18/100 R. 17-36/200	C R A B
A-11	Ans: 5.2 or 5-1/5 R. 5-2/10 R. 5-20/100	C R A B
A-12	Ans: .125 or 1/8 R. .12-2/4 R. 5/40 R. 50/400	C R A B
A-13	Ans: 2 R. 40/20 R. 20/10	C R A B
A-14	Ans: 1 ft. 7 in. R. 1-7/12 (ft.) R. 19 (in.)	C R A B
A-15	Ans: 1 hr.22min.54sec. R. 4974 (sec.) R. 1(hr.)1314(sec.) R. 1-1374/3600(hr.)	C R A B
A-16	Ans: 1 hr.40 min. R. 100 (min.) R. 1-2/3 (hr.) R. 1-40/60 (hr.)	C R A B
A-17	Ans: 2 hr. 15 min. R. 2-1/4 (hr.) R. 2.25 (hr.) R. 135 (min.) R. 8100 (sec.)	C R A B
A-18	Ans: 31 or 31/8	C R A B
A-19	Ans: 2/3	C R A B
A-20	Ans: 15 (yrs.)	C R A B
A-21	Ans: 12 (ft.)	C R A B
A-22	Ans: $44.61	C R A B
A-23	Ans: 289 (ft.)	C R A B
A-24	Ans: 30 (da.)	C R A B

A-25 Ans: 24 (acres) C R A B

A-26 Ans: 2 C R A B

A-27 Ans: 8 C R A B

A-28 Ans: 15 C R A B

A-29 Ans: 3/4 or (c) C R A B

A-30 Ans: 5394.948 C R A B

A-31 Ans: .84105 C R A B

A-32 Ans: 3.9 C R A B

A-33 Ans: 6-1/6
R. 5-7/6
R. 37/6
C R A B

A-34 Ans: 3/4 or .75 C R A B

A-35 Ans: 2.02 or 2.019
or 2-2/105
or 2 r2
R. 212/105
C R A B

A-36 Ans: 2 C R A B

A-37 Ans: 15yds.1ft.6in.
R. 558 (in.)
R. 15-1/2 (yds.)
R. 14(yd.)4(ft.)6(in.)
R. 14(yd.)3(ft.)18(in.)
C R A B

A-38 Ans: 2yds.1ft.8in.
R. 2-20/36(yds.)
R. 92(in.)
R. 2(yds.)20(in.)
C R A B

A-39 Ans: 2ft.6in.
R. 2-1/2 (ft.)
R. 30 (in.)
R. 2-6/12 (ft.)
C R A B

A-40 Ans: 1min.25sec.
R. 85 (sec.)
R. 1-25/60 (min.)
R. 1-5/12 (min.)
C R A B

A-41 Ans: 5 (hr.) C R A B

A-42 Ans: 3.8 or (e) C R A B

A-43 Ans: 410 C R A B

A-44 Ans: 1 ft. 6 in.
R. 18 (in.)
R. 1-6/12 (ft.)
R. 1-1/2 (ft.)
C R A B

DIAGNOSTIC MATHEMATICS TEST

FORM B

SCORE SHEET

NAME: _____ GRADE: _____ DATE: _____

B-1	Ans: 14726	C R A B
B-2	Ans: 718.7	C R A B
B-3	Ans: 7.02	C R A B
B-4	Ans: 2	C R A B
B-5	Ans: 1-4/5 or 1.8 R. 9/5 R. 1-20/25	C R A B
B-6	Ans: 5/12 or .42 R. 10/24	C R A B
B-7	Ans: 1-1/2 R. 3/2 R. 1-3/6 R. 9/6	C R A B
B-8	Ans: 1/12	C R A B
B-9	Ans: 1 R. 2/2	C R A B
B-10	Ans: 8.75 or 8-3/4 R. 8-15/20 R. 8-75/100	C R A B
B-11	Ans: 2.1 or 2-1/10 R. 2-10/100	C R A B
B-12	Ans: 18.3 or 18-3/10 R. 17-13/10	C R A B
B-13	Ans: 3 R. 12/4 R. 6/2	C R A B
B-14	Ans: 59 min.	C R A B
B-15	Ans: 3 ft. 7 in. R. 3-7/12 (ft.) R. 43 (in.)	C R A B
B-16	Ans: 5hr.55min.2sec. R. 4(hr.)114(min.) 62(sec.) R. 4(hr.)115(min.) 2(sec.) R. 5(hr.)54(min.) 62(sec.) R. 21,302(sec.) R. 5-3302/3600(hr.)	C R A B
B-17	Ans: 1 ft. 3 in. R. 1-1/4 (ft.) R. 1.25 (ft.) R. 15 (in.)	C R A B
B-18	Ans: 8 or 8/5	C R A B
B-19	Ans: 1-1/3	C R A B
B-20	Ans: 69 (in.) or 5 (ft.) 9 (in.) or 5-3/4 (ft.) R. 5-9/12 (ft.)	C R A B
B-21	Ans: 4 sq. ft.	C R A B

B-22

Ans: 18yds.1ft.2in.

R. 18(yd.)0(ft.)14(in.)
R. 17(yd.)3(ft.)14(in.)
R. 662(in.)
R. 55-2/12(ft.)
R. 55-1/6(ft.)
R. 17(yd.)4(ft.)2(in.)

C R A B

B-23

Ans: 412

C R A B

B-24

Ans: $75(/mo.)

C R A B

B-25

Ans: 7-1/2 or 7.5(oz.)

C R A B

B-26

Ans: 5

C R A B

B-27

Ans: 2 ten's or 20

C R A B

B-28

Ans: 6(in.) or (a)

C R A B

B-29

Ans: 306.479

C R A B

B-30

Ans: 840.730

C R A B

B-31

Ans: 4.5 or 4-1/2
or 4 r2

R. 4-5/10
R. 4-2/4
R. 18/4

C R A B

B-32

Ans: 1-1/12

R. 13/12
R.1-2/24

C R A B

B-33

Ans: 2/5 or .4

C R A B

B-34

Ans: 6-26/49 or 6.5
or 6.53

R. 320/49

C R A B

B-35

Ans: 1.97 or 1-97/100

C R A B

B-36

Ans: 3hrs.49min.15sec.

R. 3(hr.)48(min.)
75(sec.)
R. 13755(sec.)
R. 3-2955/3600(hrs.)

C R A B

B-37

Ans: 4min.30sec.

R. 270 (sec.)
R. 4-1/2 (min.)

C R A B

B-38

Ans: 2gal.2qt.1pt.

R. 21 (pts.)
R. 10-1/2 (qts.)
R. 2-5/8 (gal.)

C R A B

B-39

Ans: 21bs.3.5oz. or
3-1/2

R. 35-1/2(oz.)

C R A B

B-40

Ans: 2/7

C R A B

B-41

Ans: 1/3 or 33% or
33-1/3%

C R A B

B-42

Ans: 708

C R A B

B-43

Ans: 3yd.1ft.8in.

R. 10(ft.)8(in.)
R. 8(ft.)32(in.)
R. 128(in.)
R. 3(yds.)20(in.)
R. 3-20/36(yd.)

C R A B

B-44

Ans: 25% or 25

C R A B

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DIAGNOSTIC MATHEMATICS TEST

FORM A

Name _____
Last First

Age _____
Years Months

Grade _____

School _____

Date _____

A-1

$$\begin{array}{r} 25.10 \\ 43.002 \\ .60 \\ +\ 10.00 \\ \hline \end{array}$$

Answer _____

A-2

$$\begin{array}{r} 506 \\ -\ 283 \\ \hline \end{array}$$

Answer _____

A-3

$$\begin{array}{r} 459 \\ \times\ 73 \\ \hline \end{array}$$

Answer _____

A-4

$8\overline{)24}$

Answer _____

A-5

$$\begin{array}{r} 1/6 \\ 1/3 \\ +\ 1/2 \\ \hline \end{array}$$

Answer _____

A-6

$$\begin{array}{r} 4/5 \\ -\ 3/5 \\ \hline \end{array}$$

Answer _____

A-7

3/4 x 4/5 =

Answer _____

A-8

3/5 ÷ 5/6 =

Answer _____

A-9

8
x 60 percent

Answer _____

A-10

7.43
+ 9 3/4

Answer _____

A-11

7 3/5
- 2.40

Answer _____

A-12

.50 x 1/4 =

Answer _____

A-13

2/5 ⟌ .80

Answer _____

A-14

11 inches
+ 8 inches

Answer ___ feet ___ inches

A-15

5 hours 3 minutes 15 seconds
- 3 hours 40 minutes 21 seconds

Answer ___ hrs. ___ min. ___ sec.

A-16

25 minutes
x 4

Answer ___ hours ___ minutes

A-17

4⟌ 9 hours

Answer ___ hours ___ minutes

A-18

3 7/8 = $\frac{(?)}{8}$

Answer _____

A-19

What can the fraction 4/6 4/6 be reduced to?

Answer _____

A-20

The ages of four students are 16, 14, 17 and 13 years. What is their average age?

Answer _____

A-21

If a square is three feet high and three feet wide, how many feet is it around the square?

Answer _____

A-22

A student spent seven dollars and eighty-four cents for a sweater and thirty-six dollars and seventy seven cents for a suit of clothes. What was the total amount of money he spent?

Answer _____

A-23

The distance around a man's garden is 318 feet. The man decides to fence in all of the garden but 29 feet. How many feet of fencing must he buy?

Answer _____

A-24

If a boy takes 90 days to finish a job, and a man can work three times as fast as the boy, how long will it take the man to do the job?

Answer _____

A-25

A man has 360 acres of land. He decides to divide it into 15 areas of equal size. How big is each of these areas?

Answer _____

A-26

$x + 3 = 5$

$x =$

Answer _____

A-27

$3x = 24$

$x =$

Answer _____

A-28

In the problem below, what is the number from which 9 is subtracted?

$$\begin{array}{r} 65 \\ -39 \\ \hline \end{array}$$

Answer _____

A-29

.75 is the same as: (a) 1/4 (b) 1/3 (c) 3/4 (d) 4/5 (e) 2/3

Answer _____

A-30

$$\begin{array}{r} 3.714 \\ 568.2 \\ 4801.66 \\ 21.374 \\ \hline \end{array}$$

Answer _____

A-31

3.15
x .267

Answer _____

A-32

$6\overline{)23.4}$

Answer _____

A-33

3 1/3
+ 2 5/6

Answer _____

A-34

1/4
x 3

Answer _____

A-35

7 4/7 ÷ 3 3/4 =

Answer _____

A-36

$6.2\overline{)12\ 2/5}$

Answer _____

A-37

11 yards 2 feet 7 inches
+ 3 yards 1 foot 11 inches

Answer ___ yds.___ft.___inches

A-38

7 yards 1 foot 4 inches
- 4 yards 2 feet 8 inches

Answer ___yds.___ft.___inches

A-39

1 foot 3 inches
x 2

Answer ___feet ____ inches

A-40

3)4 minutes 15 seconds

Answer ___minutes____seconds

A-41

John can ride his bike one mile in fifteen minutes. How many hours will it take him to ride 20 miles?

Answer _____

A-42

3 4/5 is the same as:
(a) 3.5 (b) 3.4 (c) 3.45
(d) 3.75 (e) 3.8

Answer _____

A-43

.06 /24.6

Answer _____

A-44

5 /7 feet 6 inches

Answer ___feet ___inches

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DIAGNOSTIC MATHEMATICS TEST

FORM B

Name _____
Last First

Age _____
Years Months

Grade _____

School _____

Date _____

B-1

$$\begin{array}{r} 12360 \\ 1471 \\ 236 \\ +\ 659 \\ \hline \end{array}$$

Answer _____

B-2

$$\begin{array}{r} 1347.6 \\ -\ 628.9 \\ \hline \end{array}$$

Answer _____

B-3

$$\begin{array}{r} 1.17 \\ \times\ 6 \\ \hline \end{array}$$

Answer _____

B-4

$60\overline{)120}$

Answer _____

B-5

$$\begin{array}{r} 4/5 \\ 2/5 \\ +\ 3/5 \\ \hline \end{array}$$

Answer _____

B-6

$$\begin{array}{r} 2/3 \\ -\ 1/4 \\ \hline \end{array}$$

Answer _____

B-7

$$\begin{array}{r} 1/6 \\ \times \quad 9 \\ \hline \end{array}$$

Answer _____

B-8

$1/3 \div 4 =$

Answer _____

B-9

$2 \times 1/2 =$

Answer _____

B-10

$$\begin{array}{r} 2.50 \\ + \; 6\ 1/4 \\ \hline \end{array}$$

Answer _____

B-11

$$\begin{array}{r} 4.50 \\ - \; 2\ 2/5 \\ \hline \end{array}$$

Answer _____

B-12

$$\begin{array}{r} 4\ 4/5 \\ + \; 13.5 \\ \hline \end{array}$$

Answer _____

B-13

3/4 ÷ .25 =

Answer _____

B-14

36 minutes
+ 23 minutes

Answer ___hrs.___minutes

B-15

3 feet 11 inches
- 4 inches

Answer ____feet____inches

B-16

2 hours 57 minutes 31 seconds
x 2

Answer ___hrs.___min.____sec.

B-17

4/ 5 feet

Answer ____feet____inches

B-18

1 3/5 = $\frac{(?)}{5}$

Answer _____

B-19

4/3 is the same as what whole number and fraction?

Answer _____

B-20

The heights of five students are 70.2 inches, 65.8 inches, 71.0 inches, 67.9 inches and 70.1 inches. What is their average height?

Answer _____

B-21

A square is two feet high and two feet wide. How much is its area?

Answer _____

B-22

A man decides to build a fence along two sides of his lawn. One side is nine yards, one foot and eight inches. The other side is eight yards, two feet and six inches. How long a fence will he have to build around the two sides of his lawn?

Answer ____yds.____ft.____in.

B-23

Nine hundred and eleven minus four hundred and ninety-nine equals

Answer _____

B-24

A man earns $375.00 a month. If he spends 20% of his monthly income on rent each month, how much rent does he pay?

Answer _____

B-25

Sixteen packages of dried fruit weigh $7\frac{1}{2}$ pounds. How many ounces does each package weigh?

Answer _____

B-26

$7(x+5) = 70$

$x =$

Answer _____

B-27

If we add 57, 36 and 78 and don't carry a number from the one's column to the ten's column, how much too small will the total be?

Answer _____

B-28

One-sixth of a yard is:

(a) 6 inches (b) 12 inches
(c) 8 inches (d) 9 inches
(e) 10 inches

Answer _____

B-29

$6.37 + 300.00 + .10 + .009 =$

Answer _____

B-30

$$\begin{array}{r} 847.1 \\ -\ 6.370 \\ \hline \end{array}$$

Answer _____

B-31

$4\overline{)18}$

Answer _____

B-32

$$\begin{array}{r} 1/2 \\ 1/3 \\ +\ 1/4 \\ \hline \end{array}$$

Answer _____

B-33

$$\begin{array}{r} 1\ 1/5 \\ -\ \ 4/5 \\ \hline \end{array}$$

Answer _____

B-34

$1\ 3/7 \times 4\ 4/7 =$

Answer _____

B-35

$$\begin{array}{r} 37\% \\ +\ 1\ 3/5 \\ \hline \end{array}$$

Answer _____

B-36

$$\begin{array}{r} 1 \text{ hour } 36 \text{ minutes } 41 \text{ seconds} \\ +\ 2 \text{ hours} 12 \text{ minutes } 34 \text{ seconds} \\ \hline \end{array}$$

Answer ____hrs.____min.____sec.

B-37

5 minutes 15 seconds
- 45 seconds

Answer ____minutes____seconds

B-38

3 pints
x 7

Answer ____gal.____qt.____pt.

B-39

2/4 pounds 7 ounces

Answer ____pounds____ounces

B-40

What can the fraction 10/35 be reduced to?

Answer _____

B-41

A foot is what fraction of a yard?

Answer _____

B-42

8/5664

Answer _____

B-43

2 feet 8 inches
x 4

Answer ____yds.____ft.____in.

B-44

What percentage of a pound is four ounces?

Answer _____